

October 5, 2011

The Honorable J. Randolph Babbitt  
Administrator  
Federal Aviation Administration  
800 Independence Avenue, SW  
Washington, DC 20591

Dear Administrator Babbitt:

On behalf of the Research, Engineering and Development Advisory Committee (REDAC), I am enclosing the summary findings and recommendations from the fall 2011 meetings of the standing REDAC Subcommittees (Aircraft Safety, NAS Operations, Environment and Energy, Airports, and Human Factors).

The full Committee also made the following general observations:

*Research Program on UAS Operations in the National Airspace System* - The REDAC was pleased to note the progress made in defining a cohesive UAS research program. The coordination of research activities across the agency is a notable achievement. The REDAC looks forward to reviewing further progress and revised milestones in the update of the notional UAS-NAS integration roadmap.

*Pro-Active Planning for Transition from R&D to Implementation* - The REDAC has noted that several research and development projects are approaching the transition to implementation in the NAS. This transition is expected to accelerate as the NextGen R&D investments mature. It is important that the FAA adequately plan for the transition to implementation in the NAS. This will require that the needs for pre-operational testing, validation, certification, etc. be identified early and the resources planned to avoid excessive delays. It is recommended that the agency identify research and development projects as soon as they demonstrate the potential for implementation in the NAS and ensure that the appropriate operational and test personnel work with researchers to identify issues and plan for the implementation process.

*Inadequate Progress on Building FAA Internal Technical Capability in Software and Digital Systems* - The FAA has a critical need to increase its technical capability in key areas of software and digital systems due to the increasing dependence of all aspects of aviation on information technology. Due to the rapid rate of information technology change, the agency will be continually faced with unprecedented safety, certification and operational issues. Recent examples include security concerns in onboard wireless networks, use of tablet computers in the flight deck, and validation and verification of software in NextGen systems.

The REDAC has previously identified this issue and the FAA has concurred. However the REDAC is concerned that very little progress has been made. There appear to be only two or three full time qualified experts in software and digital systems throughout the agency. This number is clearly inadequate. As a consequence the FAA has been forced to rely on a few outside consultants. It seems clear that the current emphasis or approach to this by FAA top management is insufficient. The REDAC understands the challenges in attracting skilled software and digital systems expertise to the agency but urges the FAA to make this a top

hiring priority. Additionally, the FAA should develop a strategy to train and develop expertise in these areas among existing FAA personnel to develop a stronger FAA internal capability to deal with digital systems – now and in the future.

We hope that these observations are useful to you and the agency. The REDAC stands ready to assist if there is any way we can help in our common objectives of improving the safety, efficiency and capability of the air transportation system.

Sincerely,

A handwritten signature in dark ink, appearing to read 'R. John Hansman', with a stylized flourish at the end.

R. John Hansman  
Chair, FAA Research, Engineering and Development Advisory Committee

Enclosure

**Research, Engineering and Development Advisory Committee (REDAC)**  
**Guidance on the Fiscal Year 2014 R&D Portfolio**

**Subcommittee on Airports**

**Finding:** The Subcommittee is concerned with the complexity of the new initiative to conduct research on aircraft braking that involves purchase of a Boeing 737-500 digital anti-skid system from a retired aircraft and of the plans for creating artificial snow for the testing. The Subcommittee wants to receive an update on this project in the spring meeting.

**Recommendation:** Ensure that this aircraft braking friction work is coordinated with the ongoing aircraft braking research underway in the Aviation Safety Program at the Technical Center.

**Finding:** The Subcommittee is concerned that the FY 2011 funding for the Airport Technology Research Program was held to the FY 2010 level. This is a reduction of \$4,745,000 from the FY 2011 request. It is anticipated that this reduced funding level will continue into FY 2012. This could delay the start of important new research including the initiation of a program to conduct noise measurements across airport communities as well as concurrent public surveys and sleep disturbance studies. The data collected would be used to guide national aviation noise policy, determinations of community impacts from aircraft noise, Federal land use compatibility guidelines around airports, and noise mitigation funding.

**Recommendation:** The Subcommittee believes the new start on noise research is a high priority initiative. It should be included in the FY 2012 program even if it has to start at a reduced funding pace.

**Finding:** The Subcommittee is aware of the House reauthorization provision that would prohibit use of AIP funding for both Airport Technology Research and Airport Cooperative Research. If these research programs must be absorbed within the already reduced Research and Development appropriation it would require dramatic reductions in both programs.

**Recommendation:** As the Airport research programs benefit the airport community the Subcommittee recommends that the FAA support keeping these research programs within the AIP appropriation.

**Finding:** The subcommittee was pleased with the briefing on the Next Gen airport research roadmap.

**Recommendation:** That a draft update of the NAS Enterprise Architecture - Airports Infrastructure Roadmap be sent to the Subcommittee and several airports for review and comment.

### **Subcommittee on Human Factors**

**Finding:** The subcommittee has closely monitored the staffing and resources provided to the Human Factors Research and Engineering Group (HFREG) over the last several years. The subcommittee is pleased to see that senior positions are now staffed, and that the HFREG now has a well-coordinated research group that includes air traffic research at the W.J. Hughes Technical Center (WJHTC) in Atlantic City, NJ, as well as air traffic and flight deck research at the Civil Aero-Medical Institute (CAMI) in Oklahoma City, OK. Examples of this coordination were apparent, for example, in the ‘deep-dive’ presentations provided the committee on fatigue research in which personnel experienced in flight crew fatigue at CAMI were able to advise new research at CAMI, WJHTC and elsewhere in establishing coherent, sound research projects addressing fatigue in air traffic controllers, aircraft maintainers, and flight attendants. This close coordination will also be required to meet other recommendations made by this subcommittee at this meeting, notably including the need for integrated air-ground studies which will address human factors concerns spanning a range of concerns and several research performers at disparate research centers, and continued development and refinement of the Human Factors Portfolio and NextGen Human Factors Roadmaps.

**Recommendation:** The subcommittee recommends that the FAA senior leadership maintain the capability for cross-cutting human factors research as established over the past several years with the HFREG. The capability that has now been generated should be applied further to broad concerns with human performance that transcend divisions between flight deck and ground, between research centers, and between specific program and project lines within the FAA.

**Finding:** The Subcommittee reviewed high-level proposals for FY 2014 human factors research, spanning the ‘core’ and ‘NextGen’ requirements submitted in the areas of Flight Deck and Air Traffic/Technical Operations. Presentations on the core programs reflected key research areas of historic and continuing concern, including: mitigation of flight upset through advanced procedures and training; UAS human factors; certification and operational approval criteria for advanced vision systems (e.g. synthetic vision systems, enhanced vision systems, head mounted displays) and for new general aviation systems; and fatigue in a number of personnel types including air traffic controllers and aircraft maintainers. The committee found that, in some areas within Air Traffic/Technical Operations, long-range strategic plans had been overcome by NextGen planning, yet several long-standing research needs can be envisioned regardless of NextGen implementation and must be supported.

**Recommendation:** Continue with the proposed research requirements for FY 2014. In addition, a strategic plan for human factors research in Air Traffic/Technical Operations should also further clarify requirements for human factors research in support of human factors design standards applicable to all air traffic operations, in support of advanced, centralized systems and processes for technical operations, research in air traffic personnel selection and training, and fatigue in air traffic and technical operations personnel.

**Finding:** The Subcommittee reviewed the AVS Strategic Guidance for Development of the FY 2014 RE&D Safety Requirements Portfolio. Overall, the subcommittee agrees with the guidance’s intent, and welcomes its call to ‘carefully review and consider research that identifies

and assesses human factors issues.’ Specific statements are justified as being current for all aviation sections, but the justification cited is mainly from accidents in the time frame of 1987 to 2009, and only for Part 121 operations. Thus some specific comments within the strategic guidance appear to be somewhat outdated or limited to Part 121 operations. For example, Controlled Flight into Terrain (CFIT) is still listed as a hazard area requiring research, yet several mitigations such as Terrain Awareness Warning System (TAWS) and Continuous Descent Arrival (CDAs) have been recently implemented such that risk of CFITs may have been effectively mitigated in Part 121.

**Recommendation:** The AVS Strategic Guidance for Development of the FY 2014 RE&D Safety Requirements Portfolio, or its interpretation and implementation throughout the FY 2014 planning process, should reflect further, finer-grained examination of hazard categories and the aviation sectors in which they are the greatest concern. Further, research should seek, wherever appropriate, to integrate concerns across anticipated hazardous events and known hazardous events, such as the impact of broad aspects of human performance (e.g., human-automation interaction, use of emerging display systems and new avionics systems) on a wide range of hazards such as loss of control and collisions, and in response to systems and operations of increasing complexity, noting that these aspects of human performance may be concerns with both current and emerging aircraft systems and in both air transport and general aviation.

**Finding:** Current plans for research in FY 2012 and FY 2013 remain tentative in the face of uncertain resource levels. However, current plans in some key areas, notably core safety research funded by AVS, is already the product of disproportionate reductions in funding compared to recent years and compared to other business line items. Further, research plans for FY 2014 are already being solidified based on assumptions of research to be conducted in FY 2012 and FY 2013.

**Recommendation:** Should replanning and prioritizing of FY 2012 and/or FY 2013 research areas be required, research sponsors in ATO and AVS should pay careful consideration to whether the research areas have already been reduced (or FY 2014 plans will reduce them) to levels where they will not be effective, where they may terminate research (and risk losing core competency in critical areas ) in key areas, or where there is no apparent path for the work to be stretched out or delayed into later years to reach a useful conclusion.

**Finding:** The subcommittee met with the new NextGen Integration Lead for Human Factors. The subcommittee is glad that the position has been created and staffed. However, as noted in past findings, it remains unclear what authority the Integration Lead will have, how this position is intended to engender a systematic viewpoint integrating human factors concerns across NextGen projects and, thus, whether it will be situated to identify and resolve particularly cross-cutting human factors concerns that may require, for example, changes in technology, operational procedures, and concepts of operation on both air and ground sides. Processes and tools should be implemented and used so that human factors considerations are consistently and pervasively applied within NextGen projects. The NextGen Integration Lead for Human Factors should be authorized to review and approve these plans and serve as a consultant or facilitator in cases requiring specialized knowledge or cross-project integration.



**Recommendation:** Consistent with earlier recommendations, we recommend that the FAA NextGen senior leadership clarify the mechanisms by which the Human Factors Integration Lead identifies human factors issues in NextGen and guides effective cross-cutting resolutions. This requires providing the mechanisms for NextGen projects to develop effective human factors plans. Specifically, there are several ingredients required to enable the HF Integration Lead to be successful in ensuring that HF is broadly and consistently applied to FAA NextGen programs where human factors issues could impact system or product safety, efficiency, and usability. Based on industry experience, we specifically recommend that the HF Integration Lead be provided with (a) the authority to define the requirements for human factors plans to be generated by NextGen programs, including establishing and disseminating the processes and tools required to enable organizations to address integration of HF in a consistent and standard way; (b) the explicit support and endorsement of upper management to assist in increasing HF awareness and cooperation in creating and complying with HF plans by the middle level management overseeing NextGen projects, and (c) the approval authority over the human factors plans and periodic assessments of progress according to those plans. The supporting processes and tools could include design checklists, human factors plans, guidelines, and HF risk assessment tools, among others.

**Finding:** The subcommittee received a briefing on the 'Weather Technology in the Cockpit' (WTIC) program addressing earlier recommendations. The subcommittee found substantial improvements in the program's ability to define its objectives, clearer definition of actionable, feasible research projects, and the start of a good pattern of outreach and coordination with other programs within the FAA and with the broader aviation community, including definition of an SAE G-10 subcommittee established to develop useful standards for, and in coordination with, the aviation industry. However, their research plans tackle significant issues of broader interest to other NextGen developments, including the design of effective decision support and concerns with air-ground integration, which would benefit from further, deeper coordination with other entities within the FAA. Of particular concern to this subcommittee, the WTIC program would strongly benefit from the human factors expertise established within the Human Factors Research and Engineering Group (HFREG), and in turn the HFREG would be able to make better use of its resources as it can examine broad concerns with human performance in NextGen in the specific context of WTIC studies of weather information, pilot and controller decision support, and integrated air-ground decision making given a shared picture of the weather.

**Recommendation:** The subcommittee recommends that the WTIC program continue their efforts to identify the most pressing concerns related to weather technology in the cockpit, articulate specific research projects to address these concerns, and coordinate closely with all entities in the FAA who share in these concerns. Of particular note, the HFREG provides a depth of relevant expertise about human factors as well as awareness of how and where related human factors research has been, or is being, conducted.

**Recommendation:** The subcommittee recommends that the HFREG examine the WTIC research plans to look for situations where their expertise may be brought to bear, and where WTIC plans may provide opportunities to jointly conduct, or piggy back on, important activities which they do not have the resources to conduct by themselves, such as integrated air-ground human in the loop simulation studies.

### **Subcommittee on Environment and Energy**

**Finding:** One of the most promising areas of environmental research continues to be in the area of the development and certification of alternative aviation fuels. Indeed, recent approvals have enabled airlines to use biofuel blends in commercial service. Of course, much more research is necessary to expand the universe of available fuels and ensure an adequate supply of approved alternatives to currently used jet fuel.

**Recommendation:** The ongoing Commercial Aviation Alternative Fuels Initiative (CAAFI) support and alternative fuels research effort must continue to be funded, even in the face of draconian budget cuts. It is also recommended that the Agency expand its cooperative efforts with other agencies (Department of Agriculture, Department of Energy, Department of Defense, etc.) in an attempt to leverage available resources.

**Finding:** Continued Operational and Tools Research is necessary to support the implementation of NextGen initiatives and identified operational improvements should be implemented as quickly as possible.

**Recommendation:** The Agency should continue to fund environmental operational research that promises more efficient NAS operations. Specifically, the funding of the Aviation Environmental Design Tool (AEDT) that can be used to analyze the environmental consequences of various operational initiatives should continue. A usable version of this tool is on the verge of being released and can be used, for example, to measure the environmental consequences of RNAV and RNP procedures, to assess trade-offs between various pollutants and to help the United States and ICAO develop an international CO2 standard.

**Finding:** In the area of technology research, the ongoing Continuous Lower Energy Emissions and Noise (CLEEN) program to develop new aircraft and engine types with better environmental profiles shows great promise. In fact, several new products developed by the CLEEN consortium are expected to be tested in the relatively near future.

**Recommendation:** The Subcommittee recognizes the funding threat to the CLEEN program, but strongly recommends that a high priority be given to this project. As this program matures, a roadmap for transitioning NASA N+2 and N+3 technologies into the next phase of the CLEEN program should be developed.

**Finding:** United States leadership in the international community continues to be an important environmental priority, especially as the International Civil Aviation Organization (ICAO) debates the setting of a worldwide aircraft CO2 emissions standard.

**Recommendation:** The Subcommittee strongly recommends that funding necessary to support ICAO activities continue.

**Finding:** The Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) program continues to provide significant benefits in a number of environmental areas. This program enables the Agency to leverage resources and advance the state of existing knowledge

**Recommendation:** The PARTNER program should continue to be an integral part of the FAA's environmental research program.

### **NAS Operations Subcommittee**

**Finding:** The Subcommittee is pleased that NextGen is implementing a stronger focus on a System Integration function that will generate Mission Need Statements for NextGen capabilities and plan for their transition from research and development (R&D) to implementation through the use of "Capture Teams" composed of a mix of stakeholders. This should help ensure that the operational needs of NextGen are clearly articulated and there is early agreement on the R&D objectives.

**Recommendation:** The Subcommittee recommends that the new System Integration Function be applied early to the ongoing work in the airport surface domain, including Tower Flight Data Manager (TFDM), Safety Management System (SMS) and Staffed NextGen Towers (SNT) in order to achieve early alignment of the R&D objectives and a plan for transition. We would like to receive a briefing on this topic at our next subcommittee meeting in March.

**Finding:** The Subcommittee is pleased to learn that the Other Contractual Authority (OCA) and SE2020 tools have been successful in bringing many industry performers on line to provide NextGen capability where needed. While the subcommittee recognizes that FAA budget constraints will limit the total dollar amount applied to these contracts, there appears to be no structural barrier to the ability of FAA to access the broad talent base in industry and academia to address NextGen needs. We were pleased to learn that the OCA process is being used to support new work on Trajectory-Based Operation (TBO) and Flight Data Object. Also note that many of the approaches to TBO will involve non-determinism in software systems that may require Verification and Validation (V&V) capabilities that may not be part of the current suite of tools used by the FAA.

**Recommendation:** The Subcommittee requests that FAA present the Trajectory-Based Operations and Flight Data Object work at our March 2012 meeting. We also request that FAA describe how they will address the V&V issue described above.

### **Subcommittee on Aircraft Safety**

**Finding:** The subcommittee was pleased to hear about the FAA's initiative to measure the performance of the aviation research organization. As AJP is still in the process of initial implementation and phasing in the program among the various AJP organizations, they are still experimenting with the system and working on getting feedback from users. The performance metrics primarily focus on management related elements to include budget and schedule. While



it appears that most metrics are manually entered, the burden on the executing research organizations does not appear to be overly onerous. The subcommittee agrees that you can't improve what you don't measure.

**Recommendation:** Overall the subcommittee applauds the effort on the part of AJP to implement a performance monitoring system. Eventually AJP should consider expanding the elements measured to include metrics associated with the following:

- Qualitative assessment of progress towards realizing the research objectives and achieving the desired research, engineering, and development outcome. That is the technical progress and content of the research which goes beyond cost and schedule.
- Qualitative assessment of the impact the research is having on consumers/sponsors including the degree of engagement with such entities.

The subcommittee recognizes that often the users of a performance monitoring system are not the same as those who enter the data which ensures the system success. To avoid the system being marginalized, AJP should ensure that efforts required to enter the necessary data do not become overly burdensome and that it replaces other reporting mechanisms. There needs to be some benefit to those who enter the required information, not just a benefit to those who consume performance summaries. AJP should seek to ensure that input reports are completed by management principals and avoid becoming just administrative functions.

**Finding:** In its June 8, 2011 letter to the FAA Administrator, Dr. John Hansman, on behalf of REDAC, discussed the SAS recommendation on digital systems research and staffing. SAS had noted that, "as air transportation moves to the next generation, the demands for digital systems will grow.....the subcommittee remains concerned that FAA in-house capability lags behind the needs."

At its August 23-25, 2011 meeting, SAS was briefed on the current situation. FAA provided a valuable briefing on how this problem was being approached by internal work and careful use of contractors and other agencies. While, there are, and remain, two or three full-time qualified FAA experts, the level of internal FAA expertise remains low for this job to be done. It is clear that the current emphasis on this effort by FAA top management is insufficient.

**Action item** was assigned and accepted by AJP-63 to develop a White Paper which identifies the level of near and long term core in-house technical and project management skills required to support this critical research activity.

**Recommendation:** The Subcommittee reiterates its previous recommendation to FAA to apply a more appropriate number of experts within FAA to this effort. FAA top management must clarify and emphasize the critical importance of a larger FAA internal capability to deal with digital systems – now and in the future.

**Recommendation:** The SAS considers this issue to be significant enough to warrant the attention of the FAA Administrator and recommends that a special briefing by REDAC to Administrator Babbitt be scheduled.

**Finding:** The icing program continues to support high priority programs with limited in-house expertise. The program relies heavily on partners, grantees and contractors for program management. Although recruitment has not been successful, the SAS commends FAA's efforts to strengthen the in-house capability through outside consultants serving as an extension of an internal capability. **Action:** The SAS requests that progress in this area be reported during the spring 2012 review of the Icing Program.

**Recommendation:** It is important for FAA to continue to explore creative ways to strengthen the in-house capability in this critical area of research.

**Finding:** The SAS again notes the steady funding decline in the FAA Human Factors research program and is concerned that areas of research needed to support rulemaking activities important to the aviation industry will be delayed.

**Recommendation:** The SAS recommends that FAA again review the Human Factors research requirements to ensure that funding reductions in FY 2013 do not result in unintended consequences which impact rulemaking important to the aviation industry. During this review the SAS recommends that FAA take into account the following:

If the results of this review identify high priority unfunded requirements, the SAS recommends that FAA take action to spread out the programmed funding for FY 11/12/13 Human Factors research portfolios.

The history of human factors research demonstrates amply that the most valuable approach is to work in the context of real issues and specific systems.

In addition, however, certain basic work is needed by FAA to support the development of wise regulations. Examples are:

- 1) Support for regulatory efforts i.e., flight and duty time limitations rulemaking.
- 2) With the rapid growth of Electric Flight Bag (EFB) products, one key emerging area involves Class III, installed displays, which will appear the same as displays which run certified software. An investigation into how certified and un-certified displays in close proximity will be handled by flight crew would be beneficial.
- 3) As automation through software proliferates, we have seen instances where simple failures perplex pilots because of information that is removed through some association to the failure. Understanding how to assure a pilot can quickly understand the actual failure without being confused by the associated "automated" system reaction is critical." Support on emerging issues such as use of IPADS on the flight deck is a related issue.
- 4) In the growing area of datalink there is a number of growing human factors issues in commercial and general aviation cockpits. An investigation of workload and distraction during "testing while flying" in crew and single pilot cockpits would be valuable.
- 5) There is also a continuing need to emphasize and work on the vexing issue of complacency, inattention and boredom in the aviation environment – especially in a more automated aviation environment.

**Finding:** The Subcommittee continues to find the research being conducted to introduce damage tolerance requirements into the gas turbine engine rotor safe life design process to be well managed and executing to plan. The plan in place will assure proper technical treatment of this important area of gas turbine safety.

**Finding:** Continued good progress in the use of Aviation Safety Information Analysis and Sharing (ASIAS) to mine commercial flight data & perform safety assessments. Needed expansion into the General Aviation area is now also making progress. Expansion to include equipment & facility performance as part of the total System Safety event & reliability sequence is now being planned & is vital to assure System Safety. The Subcommittee notes that as ASIAS continues to absorb tens of millions of dollars annually there needs to be a commensurate set of safety analysis output deliverables that are widely disseminated and used across the FAA and industry.

**Recommendation:** The Subcommittee recommends the FAA and ASIA Executive Board be more open with the ASIAS study results / conclusions / practical implications and assure their proactive, widespread public dissemination (appropriately protecting the sources of the data per the ASIAS protocols) to derive maximum benefit for the flying community.

**Finding:** The SAS could not judge the value of research work being done based on what we heard during the review of the self-separation and air-ground integration project.

**Action Item:** The SAS requests a more detailed briefing focused on specific issues being addressed, research being done and how research results will be used.

**Finding:** The SAS again finds that the FAA with a very small but clearly expert core staff continues to leverage the work and expertise of other government agencies and the industry focus on developing standards and guidance based on critical safety issues. The theory and practical experience, and the emphasis on providing usable guidance to FAA staff and others makes this a valuable example of how to do things right. The SAS again recognizes that staying ahead of the composite aircraft fleet is critical to ensuring future continued operational safety and the SAS endorses the proactive approach to composite structure maintenance and inspection.

**Finding:** The SAS continues to find the FAA's aeromedical research capability (people, facilities, contractors) to be second to none. Quality and significance of results speak for themselves. Needs to be treated differently than a simple review of individual requirements and research projects.

**Recommendation:** The SAS suggests FAA, to the extent possible, consider treating Civil Aerospace Medical Institute (CAMI) as a national resource with a level of staff and funding level not subject to large year-to-year variations.

**Finding:** The SAS was pleased to note the progress made in defining a cohesive Unmanned Aircraft Systems Research (UAS) research project. The coordination of research activities across the agency is a notable achievement. The SAS looks forward to reviewing further progress and revised milestones in the update of the notional UAS-NAS integration roadmap which is targeted for release in the spring of 2012.

**Finding:** The SAS notes that the issues being addressed with the Weather Technology in the Cockpit (WTIC) are clear and research deliverables are to be progressively released to enable timely industry response. SAS concludes that valuable research is being accomplished for a reasonable investment.

**Finding:** The research team continues to work closely with the US Army Research Laboratories to take full advantage of the Army's knowledge and Health and Usage Monitoring System (HUMS) fleet data. Good progress in expanding Army collaboration to include OEMs, vendors and civil helicopter operators.

**Finding:** The Fire Research and Safety Program continues to be relevant, well managed and directly responsive to current and emerging requirements.

**Special Finding:** The SAS was given a world class briefing, describing world class work, being done in world class facilities by a world class research team. The briefing contained a clear description of; the issues and their significance, the research effort, results obtained or expected, what the results mean, when the results will be available and how the results will be used.

**Action Item:** The SAS requests that this briefing format be considered as a model for inclusion in future briefings.

**Finding:** The Subcommittee continues to support the research being performed in the area of Terminal Area Safety. The feasibility of estimating braking performance from on board data is an important initiative that needs to be closely coordinated with industry initiatives designed to accomplish the same goal.

The SAS was pleased to note that in response to a previous recommendation, the runway friction research aimed at reducing runway excursions has been expanded to include research into how to prevent other causes of excursions such as unstable approaches.

The SAS suggests that the establishment of a spacing goal or goals (for different applications) might be valuable in focusing the Closely Spaced Parallel Operations (CSPO) work on early and useful outcomes.

**Recommendation:** The SAS recommends that in the conduct of research on RNP/PNB and ADSB/CSPO that FAA not overlook the many years of R&D work and operational use by the industry, the results of which need to be carefully integrated into the FAA work.

**Finding:** The Subcommittee continues to support the work being done on Aircraft Catastrophic Failure Prevention. The work being done is highly relevant and continues to enjoy strong industry support.